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IFW AF

November 26, 2007


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Confirmation No. 5313
Our Reference: 12963-14

**CERTIFIED COPY OF PRIORITY DOCUMENT**

MAIL STOP: ISSUE FEE
Commissioner of Patents
P.O. Box 1450
Alexandria VA
22313-1450

Dear Commissioner:

**Re: United States Patent Application No. 10/660,528**
**For: SLAB SUPPORT TRUSS SYSTEM**
**Filed: September 12, 2003**
**Inventors: Jackson et al.**

This correspondence is further to Applicant's communication dated November 23, 2007 in which the issue fee was paid.

The present application claims priority from a foreign patent document, namely, Canadian Patent Application No. 2,403,074. A certified copy of CA '074 is enclosed herewith, to perfect the priority claim under 35 U.S.C. 119(b).

Please charge the processing fee of $130.00 to our firm's Deposit Account 02-2095. If required, please also charge any deficiency or credit any overpayment to this account.

Respectfully submitted,

James A. Raakman
Registration No. 56,624
/np
Encl.

11/27/2007 AWONDAF1 00000075 022095 10660528
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PTO/SB/21 (11-07)
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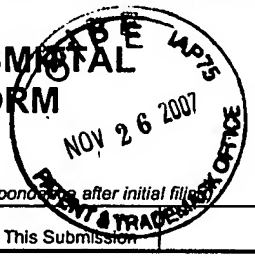


| | |
|---|---|
| Application Number | 10/660,528 |
| Filing Date | September 12, 2003 |
| First Named Inventor | Jackson |
| Art Unit | 3637 |
| Examiner Name | Michael Safavi |
| Attorney Docket Number | 12963-14 |

Total Number of Pages in This Submission

## ENCLOSURES *(Check all that apply)*

- ☑ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☑ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
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  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
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- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
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Remarks

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

| | | | |
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| Firm Name | BERESKIN & PARR | | |
| Signature | | | |
| Printed name | James A. Raakman | | |
| Date | November 26, 2007 | Reg. No. | 56,624 |

## CERTIFICATE OF TRANSMISSION/MAILING

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PTO/SB/17 (10-07)
Approved for use through 06/30/2010. OMB 0651-0032
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*Effective on 12/08/2004.*
*Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).*

# FEE TRANSMITTAL
## For FY 2008

☐ Applicant claims small entity status. See 37 CFR 1.27

| TOTAL AMOUNT OF PAYMENT | ($) | $130.00 |
|---|---|---|

| Complete if Known | |
|---|---|
| Application Number | 10/660,528 |
| Filing Date | September 12, 2003 |
| First Named Inventor | Jackson |
| Examiner Name | Michael Safavi |
| Art Unit | 3637 |
| Attorney Docket No. | 12963-14 |

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**FEE CALCULATION**

**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

| Application Type | FILING FEES Fee ($) | FILING FEES Small Entity Fee ($) | SEARCH FEES Fee ($) | SEARCH FEES Small Entity Fee ($) | EXAMINATION FEES Fee ($) | EXAMINATION FEES Small Entity Fee ($) | Fees Paid ($) |
|---|---|---|---|---|---|---|---|
| Utility | 310 | 155 | 510 | 255 | 210 | 105 | |
| Design | 210 | 105 | 100 | 50 | 130 | 65 | |
| Plant | 210 | 105 | 310 | 155 | 160 | 80 | |
| Reissue | 310 | 155 | 510 | 255 | 620 | 310 | |
| Provisional | 210 | 105 | 0 | 0 | 0 | 0 | |

**2. EXCESS CLAIM FEES**

| Fee Description | Fee ($) | Small Entity Fee ($) |
|---|---|---|
| Each claim over 20 (including Reissues) | 50 | 25 |
| Each independent claim over 3 (including Reissues) | 210 | 105 |
| Multiple dependent claims | 370 | 185 |

| Total Claims | Extra Claims | Fee ($) | Fee Paid ($) |
|---|---|---|---|
| _____ - 20 or HP = | _____ | x _____ | = _____ |

HP = highest number of total claims paid for, if greater than 20.

| Indep. Claims | Extra Claims | Fee ($) | Fee Paid ($) |
|---|---|---|---|
| _____ - 3 or HP = | _____ | x _____ | = _____ |

HP = highest number of independent claims paid for, if greater than 3.

| Multiple Dependent Claims Fee ($) | Multiple Dependent Claims Fee Paid ($) |
|---|---|
| _____ | _____ |

**3. APPLICATION SIZE FEE**

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $260 ($130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

| Total Sheets | Extra Sheets | Number of each additional 50 or fraction thereof | Fee ($) | Fee Paid ($) |
|---|---|---|---|---|
| _____ - 100 = | _____ / 50 = | _____ (round up to a whole number) | x _____ | = _____ |

**4. OTHER FEE(S)**

| | Fees Paid ($) |
|---|---|
| Non-English Specification, $130 fee (no small entity discount) | |
| Other (e.g., late filing surcharge): Certified Copy - Processing Fee | $130.000 |

**SUBMITTED BY**

| Signature | [signature] | Registration No. (Attorney/Agent) 56,624 | Telephone 416-364-7311 |
|---|---|---|---|
| Name (Print/Type) | James A. Raakman | | Date November 26, 2007 |

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# *Bureau canadien des brevets*

*Certification*

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La présente atteste que les documents ci-joints, dont la liste figure ci-dessous, sont des copies authentiques des documents déposés au Bureau des brevets.

This is to certify that the documents attached hereto and identified below are true copies of the documents on file in the Patent Office.

Specification and Drawings, as originally filed, with Application for Patent Serial No: **CA 2403074**, on September 13, 2002, by **BARRY W. JACKSON**, for "Column Hung Shoring System".

Agent certificateur/Certifying Officer

September 14, 2007

Date

Canada

(CIPO 68)
31-03-04

OPIC CIPO

## ABSTRACT OF THE DISCLOSURE

A column mounted shoring bracket has a support sub-assembly attached to a column or other supporting surface, a jack sub-assembly attached to the support and a head sub-assembly attached to a part of the jack that varies in height relative to the support. The head has a head base that supports one or more rollers for moving a form. The head also has a supporting plate for supporting the form. The supporting plate is connected to the head base so that it may be slid upwards and fixed in a position where the top of the supporting plate is above the top of the rollers, for example to carry the weight of a slab being built, or slid downwards so that the top of the supporting plate is below the top of the rollers which do not have to carry the weight of the slab being built. The connection between the supporting plate and the head base may involve a pin with an elongated conical section. An alignment tool or bracket aligns the angular position of the rollers in a horizontal plane with an external reference such as the side of a column, a wall, or a jig such as a board between columns or walls. An attachment between a head and a jack may be pivotable. The bracket is adapted for use with forms that may be made in any of a set of all widths within a range that differ from each other by a selected increment.

**Title:** Column Hung Shoring Bracket and Slab Support Systems

## FIELD OF THE INVENTION

**[0001]** This invention relates to systems of brackets hung (ie. mounted) on columns or walls for shoring or slab support, commonly known as column hung systems or column hung slab support and shoring systems.

## BACKGROUND OF THE INVENTION

**[0002]** Column hung shoring systems typically include a number of brackets mounted to the columns or walls of a building or other structures being built. A temporary slab support structure is then built between the brackets. This type of system is used to carry the load of a slab to be poured on the columns or walls, thus eliminating the need to re-shore under a relatively new slab and floors below which allows work to be done on these floors to speed up construction. For example, beams can be laid across two parallel rows of brackets and joists added between the beams. Such a structure can then be used, for example, to support a form for pouring a concrete floor or as scaffolding to facilitate other types of construction. The brackets and other temporary structure are later removed and the brackets may be re-used. The space under the floor is kept open, enabling workers easy access for other work.

**[0003]** Examples of column hung shoring brackets and shoring systems are described in US Patent No. 3,815,858 (issued June 11, 1974 to Mocny et. al.), US Patent No. 3,863,877 (issued June 1, 1973 to Gregory) and US Patent No. 3,967,806 (issued July 6, 1976 to Strickland et. al.). A foot or top plate assembly for a shoring structure or tower is described in US Patent No. 5,326,065 (issued July 5, 1994 to Jackson). The entire disclosure of all of these patents is incorporated herein by this reference to them.

## SUMMARY OF INVENTION

**[0004]** The inventor has noticed several deficiencies in prior art column mounted shoring brackets and systems. For example, prior art shoring brackets are heavy or awkward which makes them difficult to install or strip. The rollers of prior art shoring brackets are also difficult to align with the rollers of other shoring brackets or with the direction in which a pre-made form will be rolled onto or off of the brackets and so their rollers often bind and work against each other. Further, prior art shoring brackets are not well integrated into shoring systems and require excess amounts of custom installation work. It is an object of the invention to improve on one or more of these or other deficiencies of the prior art. Another object of the invention is to provide a shoring bracket consisting of a small number of easily handled sub-assemblies. Another object of the invention is to provide a shoring bracket or shoring bracket head sub-assembly wherein the relative elevation of one or more rollers and a supporting plate can be varied to transfer a form easily between the rollers and supporting plate. Another object of the invention is to provide a shoring bracket or shoring bracket head with rollers that can be aligned quickly with an external reference, for example so that rollers of multiple brackets may be made parallel with each other. Another object of the invention is to provide a shoring bracket that can be quickly installed against columns of any spacing and accept pre-made forms made in widths differing by a constant interval. These and other objects of the invention are met by the combination of features, steps or both described in the claims. The following summary may not describe all necessary features of the invention which may reside in a sub-combination of the following features or in a combination of some or all of the following features and features described in other parts of this document.

**[0005]** In some aspects, the invention provides a shoring bracket that may be broken down into three or four sub-assemblies; a support, a jack, a head and an alignment bracket, the alignment bracket optionally being part of the head sub-assembly. The support sub-assembly attaches to a column,

wall or other supporting surface of a structure being constructed. The jack sub-assembly is attached to the support and has a part with a variable height relative to the support. The head sub-assembly is attached to the part of the jack that varies in height relative to the support.

**[0006]** The head has a head base that supports one or more rollers. The rollers are adapted to support a form while moving the form into or out of a position over the shoring bracket. The head also has a supporting plate for supporting the form in position over the shoring bracket. The supporting plate is connected to the head base so that it can slide vertically relative to the head base and the rollers. In particular, the supporting plate may be slid upwards and fixed in a position where the top of the supporting plate is above the top of the rollers or slid downwards so that the top of the supporting plate is below the top of the rollers.

**[0007]** In an embodiment, the connection between the supporting plate and the head base is made between a supporting plate element that extends downwards from the supporting plate and a head base element that extends upwards from the head base. The supporting plate element and head base element can slide one within the other, the outer dimensions of one fitting within the inner dimensions of the other. For example, the supporting plate can be a vertically oriented rectangular section which and the head base element can define a slightly larger rectangular cavity. By sliding the supporting plate element relative to the head base element, holes in the elements can be aligned horizontally to accept a pin having an elongated conical section. The holes may differ in diameter to correspond with the taper of the conical section of the pin and may also be tapered to frictionally receive the pin. When a the pin is inserted into the holes so that a wider portion of the pin contacts the holes, the supporting plate is lifted and held so that its upper surface is above the upper surface of the rollers. When the pin is driven out so that a narrower portion contacts the holes, the supporting plate is lowered so that its upper surface is below the upper surface of the rollers.

**[0008]** In other aspects, the invention provides an alignment tool for aligning the angular position of the rollers in a horizontal plane with an external reference. The external reference may be, for example, the side of a column, a wall, or a jig such as a board between columns or walls.

**[0009]** In an embodiment, the jack may be prevented from rotating and the head is fixable but rotatable in a horizontal plane relative to the jack. An alignment tool communicates with the head for aligning the angular position of the rollers in a horizontal plane with an external reference. Once aligned, the head containing the rollers is fixed to the jack so that they can no longer rotate.

**[0010]** In another aspect, the invention provides a shoring bracket wherein an attachment between a head and a jack is pivotable.

**[0011]** In another aspect, the invention provides a shoring apparatus. The shoring apparatus has a plurality of shoring brackets mountable in opposed sets, each set attached to opposed lines of columns or other supporting surfaces of a structure being constructed. The shoring apparatus also has one or more forms that can be made in a plurality of widths within a range, the widths differing by an increment. The forms also have form members that rest on supporting plates of the shoring brackets. The jacks of the shoring brackets may be attached to the support in at least two positions, the two positions being spaced in the horizontal direction between the opposed sets of shoring brackets by one half of the increment. The supporting plates are wider than the form members by at least one half of the increment in the horizontal direction between the opposed sets of shoring brackets. In this way, a pre-made form can be selected and installed between columns spaced at any distance apart within the range.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0012]** For a better understanding of the invention, and to show more clearly how it may be made and used, one or more exemplary embodiments of the invention will be described below with reference to the following drawings:

**[0013]** Figures 1 and 2A are side and front views respectively of an exemplary embodiment of a column or wall hung shoring bracket. Figure 2B is a front view of the bracket of Figure 2A in a pivoted orientation.

**[0014]** Figures 3, 4 and 5 are top, front and side views of a support of the embodiment of Figures 1 and 2.

**[0015]** Figures 6, 7 and 8 are top, front and side views of a head of the embodiment of Figures 1 and 2. Figures 19 to 21 show an alternate embodiment of parts shown in Figures 6, 7 and 8.

**[0016]** Figure 9 is a side view of part of an exemplary embodiment of a form.

**[0017]** Figures 10 to 18 show orthographic projections of various sub-assemblies of the head of Figures 6, 7 and 8.

## DETAILED DESCRIPTION OF THE INVENTION

**[0018]** Figures 1 and 2 show a shoring bracket 10 according to a first embodiment of the invention. The shoring bracket 10 with three sub-assemblies: a jack 12, a support 14 and a head 16. The support 14 provides an attachment between the jack 12 and a column 18, the column 18 being typically steel or reinforced concrete, or other supporting surface. The jack 12 is adjustable so that a portion of it may be moved up or down relative to the

support 14. The head 16 is attached to the movable portion of the jack 12 and is used to support a form 20 or other structure. Although the shoring bracket 10 will be described below as attached columns 18, the shoring bracket 10 may also be attached to walls or other vertical structures, or even to non-vertical structures with some modification. The shoring bracket 10 may be made primarily of aluminum to reduce the weight of each sub-assembly.

**[0019]** The jack 12 has a threaded rod 22 that slides inside of a sleeve 24. An upper wing nut 26 rotates on the threaded rod 22 and abuts the top of the sleeve 24. Rotating the upper wing nut 26 raises or lowers the threaded rod 22 relative to the sleeve 24 and support 14. A lower wing nut 28 may also be threaded onto the threaded rod 22 to abut the bottom of the sleeve 24. With the upper wing nut 26 set in a desired position, the threaded rod 22 may be releasably but firmly fixed at a desired height and prevented from rotating or wobbling by tightening the lower wing nut 28. As well as abutting the sleeve 24, the wing nuts 26, 28 may have a narrow section 30 that fits inside of the sleeve 24 and centers the wing nuts 26, 28 relative to the sleeve 24. This further inhibits the threaded rod 22 from wobbling in the sleeve 24. Wing nuts 26, 28 without these narrow sections 30 may also be used in which case the outer diameter of the threaded rod 22 is made closer to the inner diameter of the sleeve 24. This embodiment will also function without the lower wing nut 28, but it may be less convenient to use since it may then rotate or wobble if it is bumped before it is loaded with weight.

**[0020]** The top of the threaded rod 22 is fitted with a head mounting plate 32. The head mounting plate 32 may be attached to the threaded rod 22 through a jack pivot 34. The jack pivot 34 may be generally parallel to primary rollers 66 (which will be discussed below) or may be generally perpendicular to primary rollers 66. In some embodiments or methods of using embodiments, the jack pivot 34 may be made substantially parallel or perpendicular to primary rollers 66. This pivotable connection between the head mounting plate 32 and the threaded rod 22 is particularly useful for

building stairways, sloped floors or roofs or other non-horizontal structures, the axis of the jack pivot 34 being oriented as required for the desired slope. Figure 2B shows the head mounting plate 32 in a pivoted position. The head mounting plate 32 has head mounting holes 33 made to accept bolts for fastening the head 16 to the head mounting plate 32.

**[0021]** Other sorts of jacks 12, such as tractor jacks or hydraulic jacks, may also be used although they are typically more expensive and may not provide as fine a height adjustment. Other forms of screw jacks may be used, such as those having a threaded rod that turns in a threaded sleeve, but with these the angular position and height of the threaded rod cannot be independently varied. Accordingly, a connection that can be rotated through a large angle will be required between the threaded rod 22 and head mounting plate 32 or head 16, or some ability to make fine height adjustments may be lost.

**[0022]** Figures 3, 4 and 5 show the support 14 in more detail. Two sleeve plates 36 are welded to the sleeve 24 to form a pair of vertical, parallel planes. A mounting block 38 fits inside of the sleeve plates 36 and is welded to a mounting plate 40. The mounting plate 40 has mounting plate holes 42 to accept bolts for attaching the mounting plate 40 to a column. Various other means, such as clamps or other connections using bolts, may be used to attach the mounting plate 40 to the column 18 or walls etc.

**[0023]** The mounting block 38 has two or more sets of mounting block holes 44, each set being located along a vertical line but at different horizontal distances from the mounting plate 40. The sleeve plates 36 each have a set of sleeve plate holes 46 located to line up with the sets of mounting block holes 44. By choosing which set of mounting block holes 44 to align with the sleeve plate holes 46, an installer can locate the sleeve 24 at different horizontal distances from the mounting plate 40 as shown in Figures 5A and 5B. As will be discussed below, the shoring bracket 10 may be used with

forms 20 which can be made in widths varying within a range by a short increment, for example 3 inches. When used with such a form 20, two sets of mounting block holes 44 may be spaced apart by about one half of the increment, for example 1.5 inches if the increment is 3 inches. This allows a head 16 with the features discussed below to be positioned to accept the form 20 regardless of the distance between opposed columns 18, provided that the distance between opposed columns is within the range. Alternately, slots may be provided in one or both of the sleeve plates 36 or mounting block 38. This allows the distance between sleeves 24 on opposed columns 18 to be varied infinitely as required to fit a form 20 as described above without a head 16 as described above, of to fit other types of forms. Other mechanisms, such as a carriage that can be positioned on a ledge or other structure extending horizontally from a column 18, may also be used to allow the sleeve 24 to be positioned at various horizontal distances from the column 18. If a different sort of form will be used, for example a form that is made in place after the shoring brackets 10 are erected, then it may not be necessary to allow for mounting the sleeve 24 at multiple distances from the mounting plate 40. In such a case, the support 14 may be permanently or semi-permanently attached to the jack 12, although the resulting assembly may then be heavy and more difficult to install than two smaller assemblies.

**[0024]** Figures 6, 7 and 8 show a head 16. Figures 10 to 18 also show various components of the head 16 separated from each other. Referring to these Figures and Figures 1 and 2, the head 16 has a head base 48 with head base holes 50. The head base holes 50 accept bolts for attaching the head 16 to the head mounting plate 32 of the jack 12. One or both of the head base holes 50 or the head mounting holes 33 may be made oversize relative to the bolts passing through them. This allows the head base 48 to be rotated slightly relative to the head mounting plate 32 of the jack 12. The jack 12 can then be raised to the desired height and rotated so that, by eye, the head mounting plate 32 is positioned such that the head 16 will be roughly oriented relative to an external reference, such as the column 18. For final

alignment of the head 16, an alignment tool 52 is provided, for example on the head 16. The alignment tool 52 is kept square to the head 16 but may slide from side to side relative to the head 16. In this embodiment, this motion is achieved through guides 54 which slidably engage a pair of opposed parallel surfaces presented by two of four base walls 56 welded to the head base 48. Alignment tool slots 58 allow bolts slipped through the head base holes 50 to also pass through the alignment tool 52.

**[0025]** To install the head 16 on a jack 12 that has been fixed in position, the head 16 is placed on top of the head mounting plate 32. Bolts are passed through the head base holes 50, the alignment tool slots 58 and head mounting holes 33. The heads or nuts of these bolts may have pins through them, or other features that keep them from rotating relative to the head 16, to allow the bolts to be tightened with a single tool from below. The alignment tool 52 is then pressed against an external reference, such as the face of a column 18 or a board placed across multiple columns 18, until its face 60 is flat against the reference. This may be done, for example, by tapping the alignment tool 52 with a hammer. The bolts are then fully tightened to fix the head 16 to the jack 12 and the alignment tool 52, which is fixed in position against the external reference. In this way, a single or multiple heads 16 can be aligned directly to an external reference. Other sorts of alignment tool may also be used to align the head 16 directly to an external reference before the head 16 is rotationally fixed.

**[0026]** Alternately, the lower wing nut 28 of the jacks may be kept slightly loose so that the threaded rod 22 of the jack 12 can rotate. The head 16 can then be fixed to the threaded rod 22 before the head 16 is aligned to the external reference. The head 16 is later aligned to the external reference and, once aligned, the lower wing nut 28 is fully tightened to prevent the threaded rod 22 from rotating further and to preserve the alignment. This method avoids the need for a rotatable connection between the head 16 and the jack 12 or allows the head mounting plate 32 or other parts to be omitted

or simplified. However, the jack 12 remains in a less secure state for a longer part of the process and an alignment tool must be provided in a location that does not contact the bolts between the head 16 and the jack 12. Further alternately, the head 16 may be made freely rotatable on the jack 12, for example by omitting the head mounting plate 32 and attaching a tube on the bottom of the head base 48 that slips over but does not otherwise engage the threaded rod 22. A lower wing nut 28 may now be used or not used as desired. The head 16 is still aligned to the external reference by sliding the alignment tool 52 so that its face 60 is flat to the external reference. The alignment tool 53 is then fixed to the head 16 to preserve the alignment, for example by tightening a bolt through the alignment toll slots 58 and the head base holes 50 while the face 60 of the alignment tool 52 is pressed flat against the external reference. In this way, even though the jack 12 may rotate relative to the head 16, the head 16 remains aligned to the external reference. With these alternatives, other alignment tools could be used, including alignment tools that work between the jack 12 and the external reference.

**[0027]** The shoring bracket 10 or alternate designs described above could also be modified so that the head 16 is not removable from the jack 12, whether the head 16 may rotate on the jack 12 or not. However, having a head 16 that may be removed from the jack 12 creates conveniently sized sub-assemblies. In particular, an installer can manually lift and position each sub-assembly without undue difficulty while the total number of separate sub-assemblies remains small. The sub-assemblies are easily connected and stripped and the alignment of the head can be done with only a hammer and a single wrench worked from below.

**[0028]** Figures 6, 7 and 8 show other features of the head 16. Two of the base walls 56 extend from side to side across the head base 48. These two base walls 56 have a pair of vertical end plates 64 welded to them. The end plates 64 support a pair of primary rollers 66 which allow the form 20 to

be rolled into or out of position. A single primary roller 66 may also be used. Optional guide rollers 68 or other guides may also be attached to the end plates 64 to help keep the form 20 properly located over the primary rollers 66.

**[0029]** Although the primary rollers 66 support the form 20 while it is being positioned, a supporting plate 70 supports the form 20 while the form 20 is in use and bearing weight. The supporting plate 70 has a rectangular section 72 welded below it. The rectangular section 72 slides up or down in the square cavity 62 created by the base walls 56 but does not rotate significantly, either in horizontal or vertical planes, within the square cavity 62. Other shapes, such as circular sections, may also be used although the rectangular sections keep the supporting plate 70 and head base 48 aligned at all times.

**[0030]** Up and down movement of the supporting plate 70 is achieved through a tapered pin 74 interacting with tapered holes 76 in the base walls 56 and the rectangular section 72. When the tapered pin 74 is inserted into the tapered holes 76, the supporting plate 70 is driven upwards so that the top of the supporting plate 70 is above the top of the primary rollers 66. The supporting plate 70 thus supports the form 20 while the form is being used and loaded with weight. When the form 20 is no longer required, the tapered pin 74 is knocked at least partially out of the tapered holes 76 which allows the top of the supporting plate 70 to drop below the top of the primary rollers 66. The top of the primary rollers 66 are located far enough below the height of top of the supporting plate 70 with the form 20 loaded so that the form 20 drops free of the work above and rests on the primary rollers 66. Thus the primary rollers 66 may designed for the weight of the form 20 alone and the form 20 can be rolled in or out of position on them. The ends of the tapered pin 74 may be fitted with cotter pins or other means to keep the tapered pin 74 from being separated from the head 16.

**[0031]** The supporting plate 70 may be flat or may have supporting plate sides 78. The supporting plate sides 78 further contain the form 20 and may angle outwards as shown to assist in guiding the form 20 into place. Optionally, means for securing the form 20 to the supporting plate 70 may be added, but are not typically required.

**[0032]** The relevant parts of the head 16 are sized to permit a maximum width of an object that may rest on the supporting plate 70. This maximum width may exceed the expected width of any part of the form 20 that will rest on the supporting plate 70. For example, the distances between the insides of the supporting plate sides 78, or between the insides of any guide rollers 68, may be made to exceed the width of a sill beam 80 of the form 20. This allows a pre-made form 20 to rest on the supporting plate 70 even if the distance between opposed sill beams 80 of the form 20 are not precisely the same as the distance between the centers of an opposed pair of supporting plates 70. Further, forms 20 may be pre-made in any of a set of spans with a range, the spans differing from each other by a fixed width increment, for example 3 inches. In this case, the maximum width can be made at least one half of the increment, i.e. 1.5 inches, wider than the sill beam 80 of the form 20. In combination with a support 14 as described above that permits the distance between opposed pairs of jacks 12 to be altered, such a head 16 will permit a pre-made form 20 available in widths varying by the incremental size to be selected to fit any random distance within the range between opposed columns 18.

**[0033]** Figure 9 shows parts of a form 20. The form 20 has a pair of sill beams 80, each sill beam spanning across one of a pair of opposed lines of shoring brackets 10. The sill beams 80 in turn support a plurality of trusses 82. The trusses 82 and sill beams 80 are made of lengths of extrusions, for example of aluminum, which are bolted together to form efficient load carrying shapes. The configuration of the trusses 82 may vary from the shape shown for different spans. Multiple sets of trusses 82 may be made in regular

increments, for example 3" increments, of length. Alternately, the extrusions may be provided in varying lengths and with extrusion holes 84 at regular intervals. These lengths and intervals are chosen so that trusses 82 can be provided at a range of spans varying by an interval, for example 3". To provide this interval, extrusions holes 84 may be provided at the interval or, to reduce the number of holes, at two or more larger distances that can be used together to create larger intervals. For example, extrusion holes 84 on 6" and 9" intervals can be used to create trusses 82 having spans that vary by 3". The trusses also have quick-connect fittings 86 such as those used in scaffolding for attaching pairs of diagonal cross-members between adjacent trusses 82 in a completed form 20.

**[0034]** Figures 19 to 21 show alternate embodiments of parts shown in Figures 6, 7 and 8. Based on the description above and these figures, the structure, use and operation of these alternate embodiments, and how they differ from other embodiments, will be apparent to a person skilled in the art. One difference is that the head base 48B shown in Figure 19 has head base slots 51 instead of head base holes 50. The head base slots may be 4" long and increase the extent to which the distance between opposed head bases 48B, or between a head base 48B and an adjacent column 18. Figure 20 shows an alternate alignment tool 52B. The alignment tool 52B has a hammering bar 88 for knocking the alignment tool 52B into position and a wider face 60B. The alignment tool 52B also has a pair of guide strips 90 welded to the top edge of the guide 54. The guide strips 90 are parallel to each other and their inside edges are spaced apart by a distance slightly greater than the width of the head base 48B. In this way, the head base 48B can be placed on top of the guides 54 and the guide strips 90 keep the alignment tool 52B aligned with the head base 48B but allow the alignment tool 52B to slide relative to the head base 48B. The shoring bracket 10 is assembled by placing the alignment tool 52B on top of the head mounting plate 32 and then placing the head base 48B onto the alignment tool 52 and within the guide strips 90. The alignment tool 52B is tapped against an

external reference to align the head base 48B to the external references, and then a bolt passing through the head base 48B, alignment tool 52B and head mounting plate 32 is tightened to fix the head base 48B in proper position and orientation. Figure 21 shows the head base 48B fitted on the alignment tool 52B. In this embodiment, the alignment tool 52B may be separated from the head 16 and so may be treated as a separate sub-assembly (making 4 sub-assemblies) or as part of the head sub-assembly. Further, the alignment too 52B can be inverted and placed so that the guides 54 rest on the head base 48B, the guide strips 90 extending over the edge of the head base 48B. In this way, the alignment tool 52B cannot be separated from the head 16 without taking the head 16 apart and so is part of the head sub-assembly. Other embodiments of the invention may be made in other configurations and operated according to other methods within the scope of the invention. The scope of the invention is defined by the following claims.

**Claims:**

I claim:

1. A head for a shoring device comprising,

(a) a head base supporting one or more rollers, the rollers adapted to support a form while moving the form into or out of a position over the shoring device;

(b) a supporting plate for supporting the form when it is in the position;

(c) a vertically slidable connection between the supporting plate and the head base,

wherein the supporting plate may be slid upwards and fixed in a position where the top of the supporting plate is above the top of the rollers or slid downwards so that the top of the supporting plate is below the top of the rollers.

2. The head of claim 1 wherein the vertically slidable connection includes,

(a) a supporting plate element extending downwards from the supporting plate;

(b) a head base element extending upwards from the head base; and,

(c) a pin having an elongated conical section,

wherein the supporting plate element and head base element are each provided with one or more holes which can be aligned horizontally to accept a wider portion of the pin and wherein the variation in size of the of the pin from the wider portion to a narrower portion is sufficient to cause the top of the supporting plate to move between positions above and below the top of the rollers when the pin is moved horizontally into or out of the holes.

3. The head of claim 2 herein the supporting plate element and head base element have horizontal cross-sectional shapes that may slide vertically one within the other, but which inhibit rotation of one relative to the other in a vertical plane or inhibit movement of one horizontally relative to the other.

4. The head of claim 2 wherein the inner horizontally dimensions of a vertically extending cavity horizontal of one element are slightly larger than the outer dimensions of a horizontal cross-section of other element.

5. The head of claim 4 wherein the shape of the vertically extending cavity and the horizontal cross-section of the other element are both rectangular or such that one will not rotate within the other.

6. A head according to any preceding claim having an alignment tool for aligning the angular position of the rollers in a horizontal plane with an external reference.

7. The head of claim 6 wherein the external reference is any one of a column, wall, jig or board between columns or walls.

8. A shoring support bracket comprising,

(a) a support for attaching the shoring bracket to a column or other supporting surface of a structure being constructed:

(b) a jack attached to the support and having a portion with variable height relative to the support; and,

(c) a head of any of claims 1 to 5 attached to the portion of the jack with variable height.

9. The shoring support bracket of claim 8 having an alignment tool or bracket for aligning the angular position of the rollers in a horizontal plane with an external reference.

10. The shoring bracket of claim 9 wherein the external reference is any one of a column, wall, jig or board between columns or walls.

11. The shoring bracket of claim 8 wherein the jack may be prevented from rotating, the head is fixable but rotatable in a horizontal plane relative to the jack and having an alignment tool or bracket communicating with the head for aligning the angular position of the rollers in a horizontal plane with an external reference.

12. The shoring bracket of claim 8 wherein the attachment between the head and the jack is pivotable.

13. The shoring bracket of claim 8 wherein the attachment between the head and the jack is pivotable about an axis parallel with or perpendicular to the one or more rollers.

14. A shoring apparatus comprising,

A) a plurality of shoring brackets mountable in opposed sets, each set attached to opposed lines of columns or other supporting surfaces of a structure being constructed and each having,

(a) a support for attaching the shoring bracket to a column or other supporting surface of a structure being constructed;

(b) a jack attached to the support, the jack having a portion with variable height relative to the support;

(c) a head attached to the portion of the jack with variable height and having a supporting plate for supporting objects above then head; and,

B) one or more forms that can be made in any of a set of all widths within a range that differ from each other by a selected increment, and having form members which rest on the supporting plate of the head,

wherein the jack may be attached to the support in at least two positions, the two positions being spaced horizontally in the direction between the opposed sets of shoring brackets by one half of the increment,

and wherein the supporting plates of the head are wider than the form members by at least one half of the increment horizontally in the direction between the opposed sets of shoring brackets.

15. The shoring apparatus of claim 14 with a head according to any of claims 1 to 5.

16. The shoring apparatus of claim 15 wherein the attachment between the head and the jack is pivotable.

17. The shoring apparatus of claim 16 wherein the attachment between the head and the jack is pivotable about an axis parallel with or perpendicular to the one or more rollers.

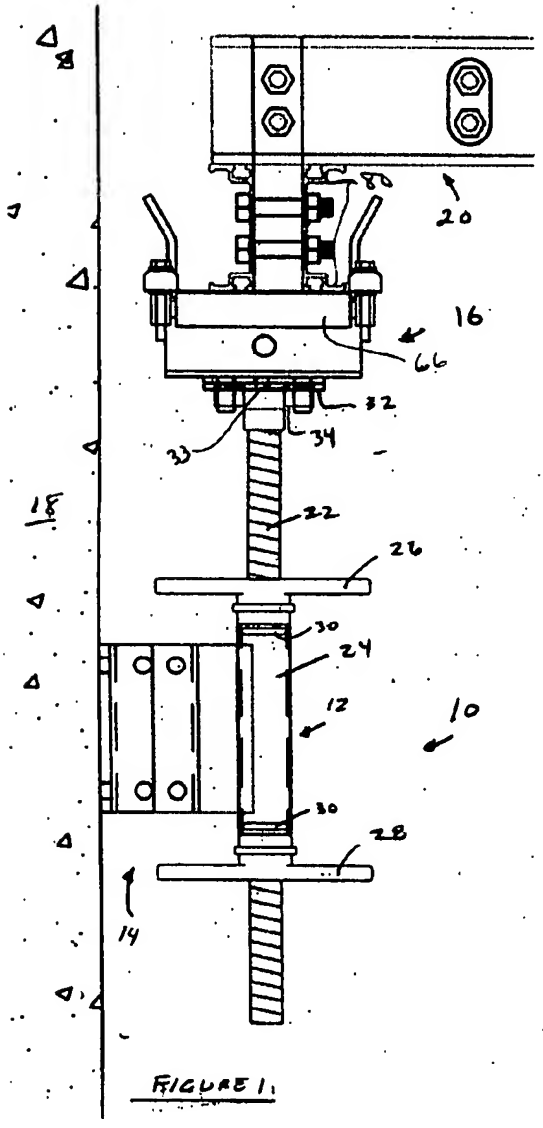


FIGURE 1.

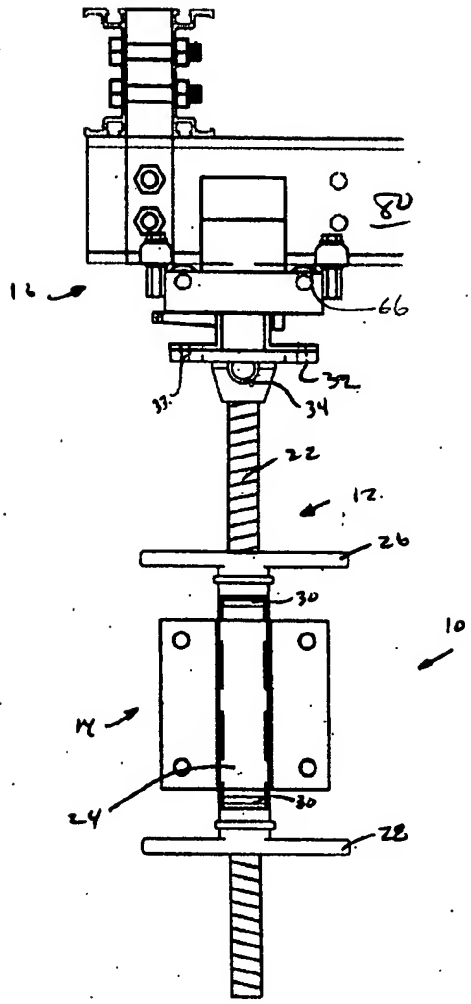


FIGURE 2A

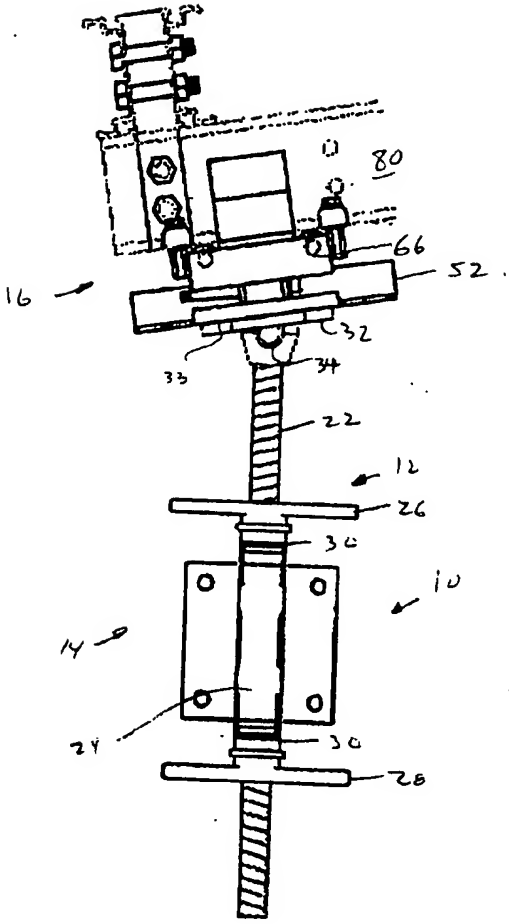


FIGURE 2B

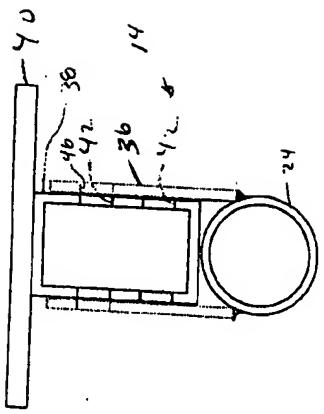


FIGURE 3

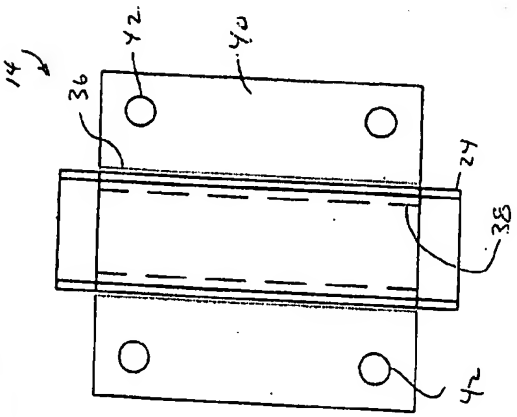


FIGURE 4

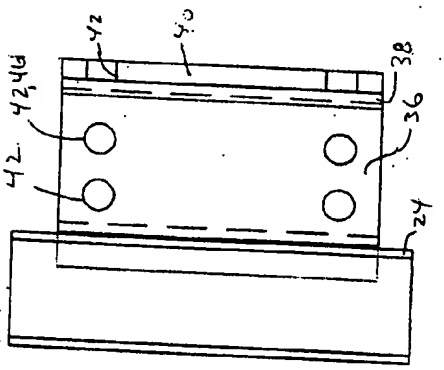


FIGURE 5A

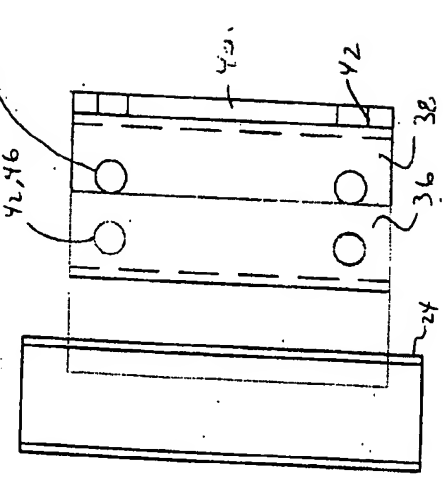


FIGURE 5B

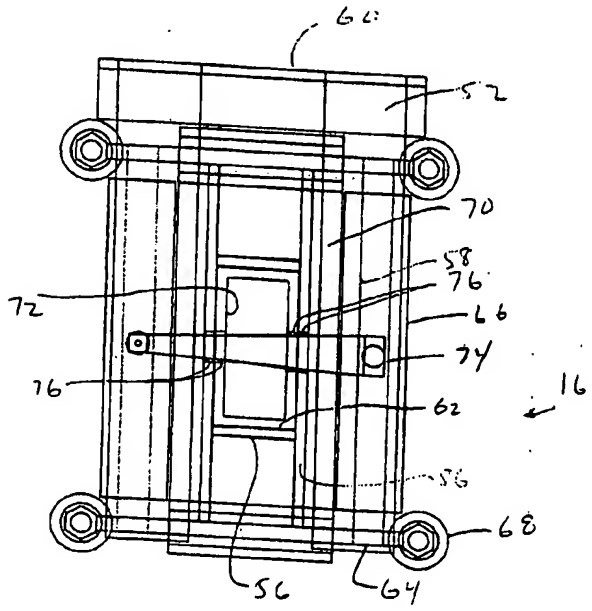


FIGURE 6

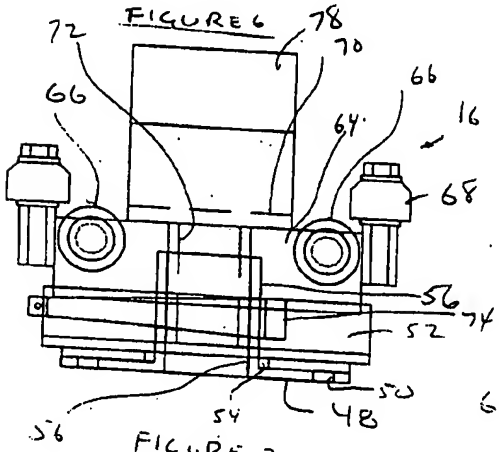


FIGURE 7

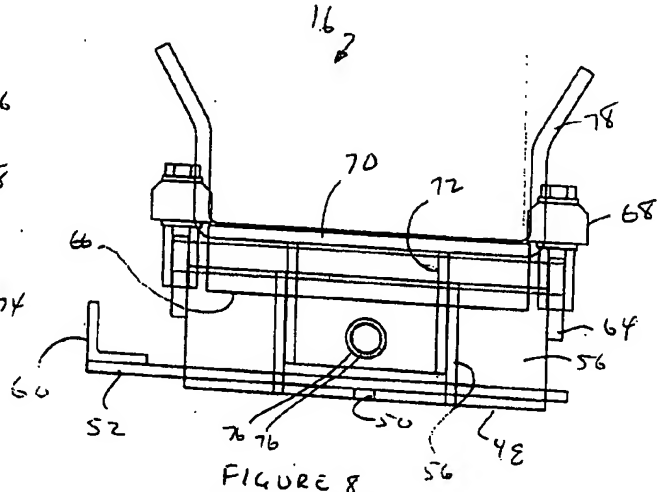


FIGURE 8

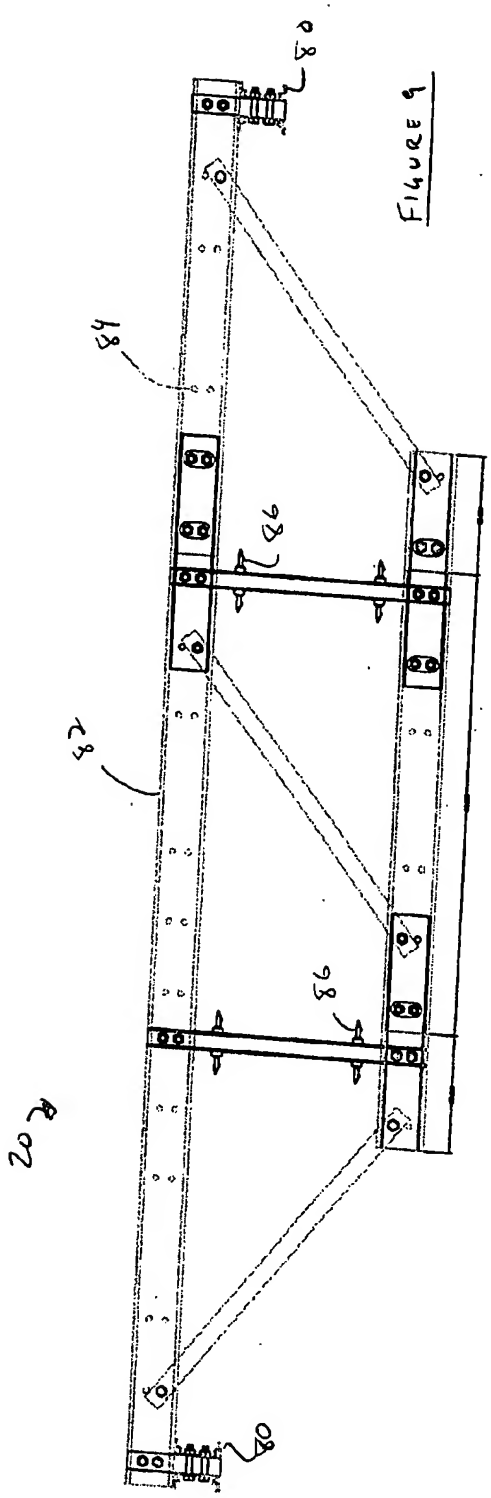


FIGURE 9

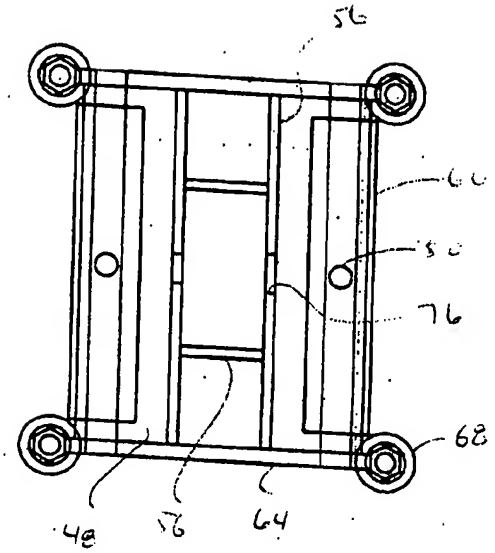


FIGURE 10

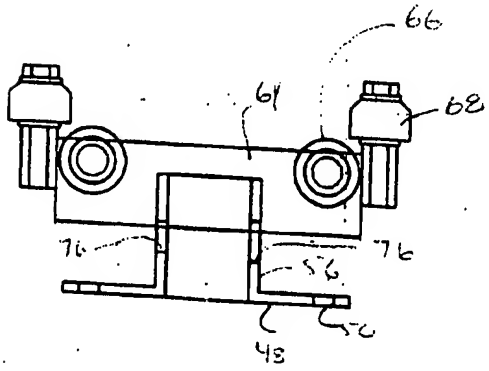


FIGURE 11

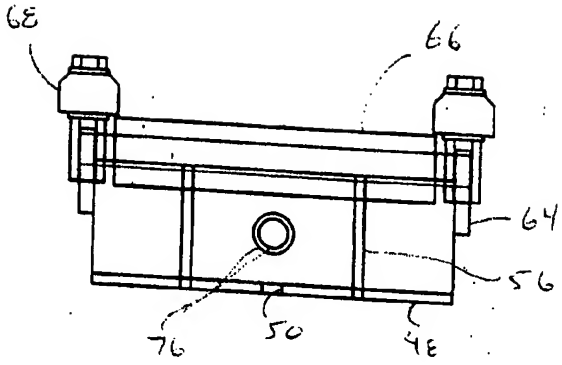


FIGURE 12

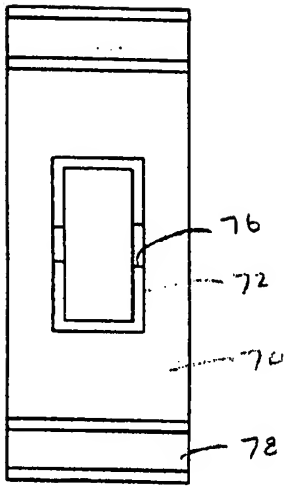


FIGURE 13

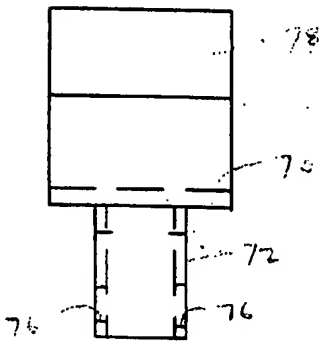


FIGURE 14

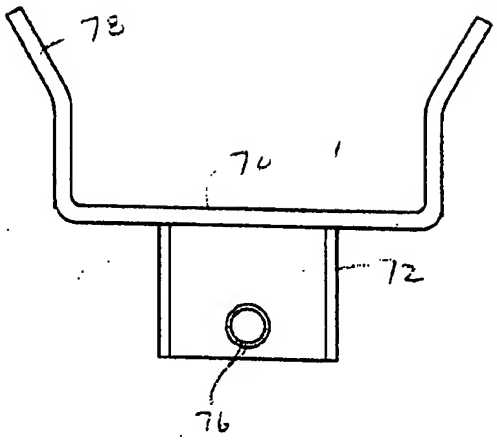


FIGURE 15

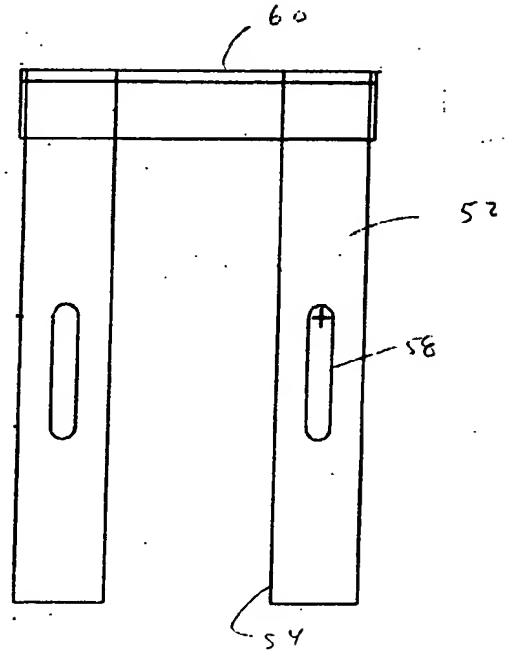


FIGURE 16

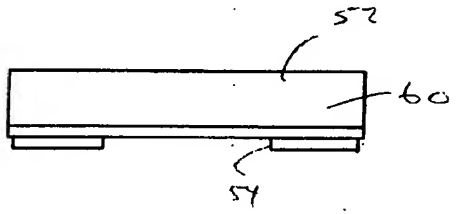


FIGURE 17


FIGURE 18

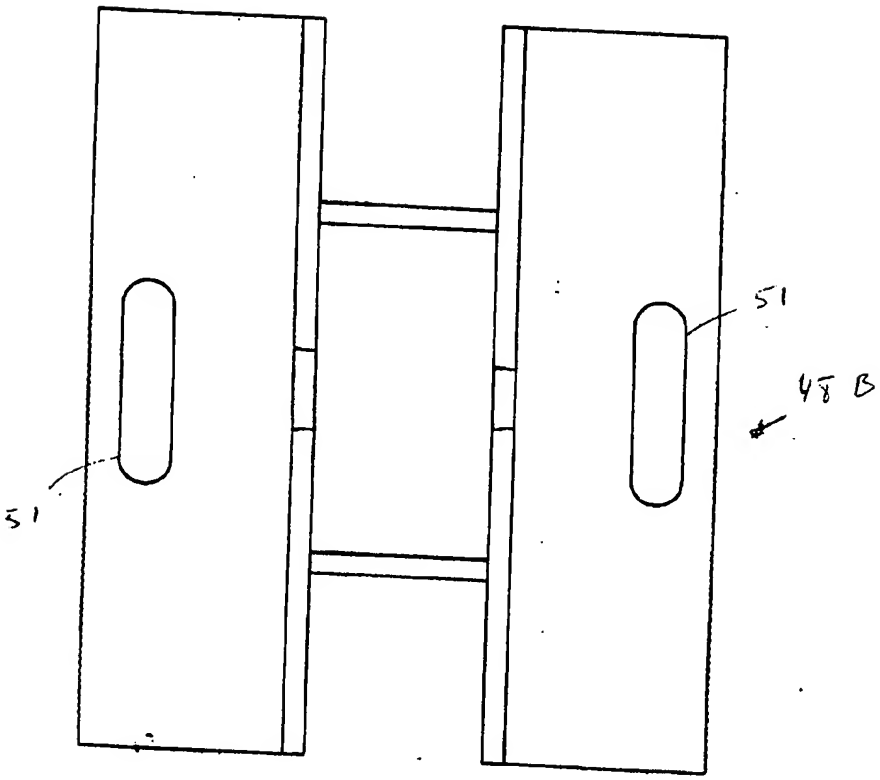


FIGURE 19

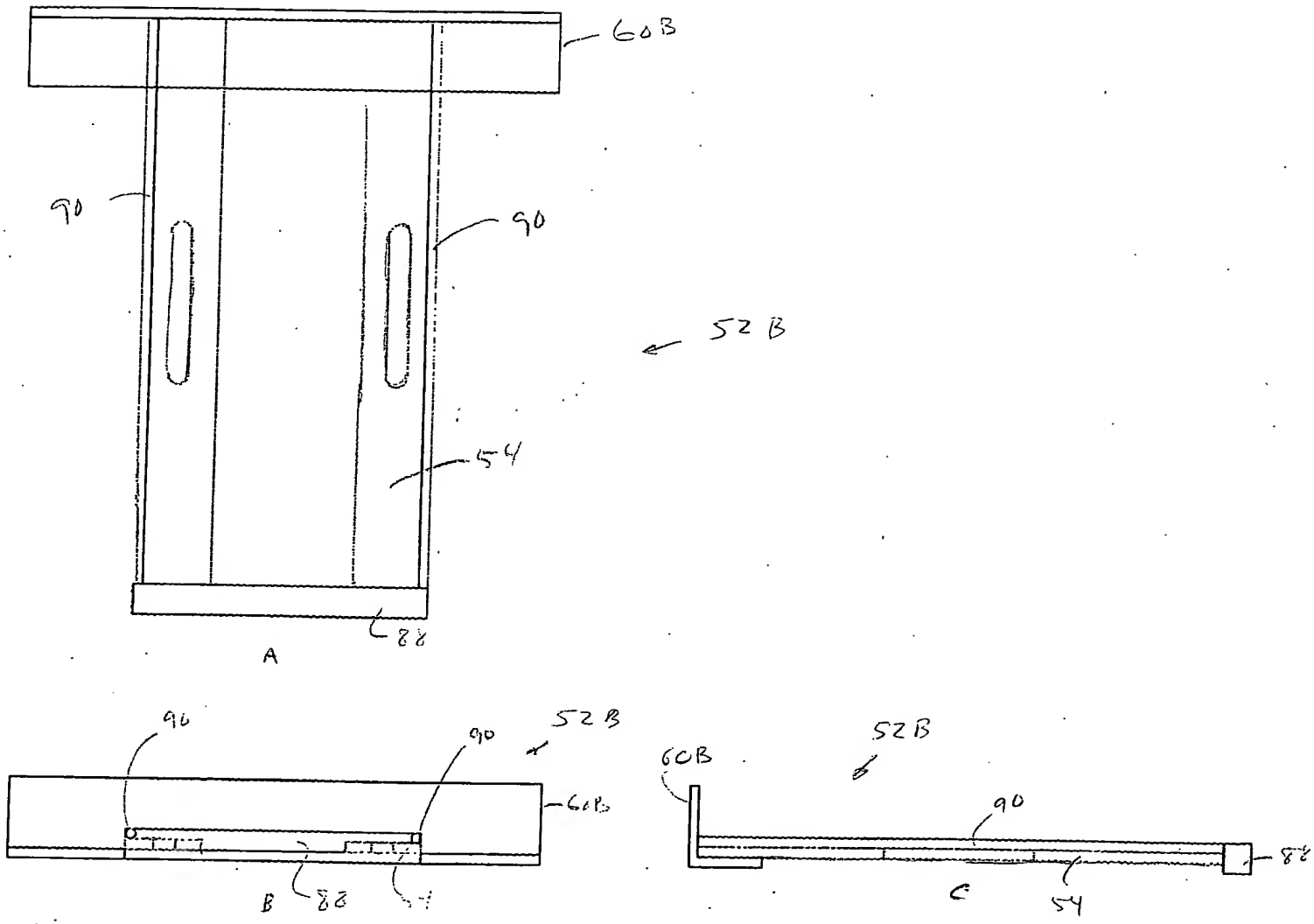


FIGURE 20

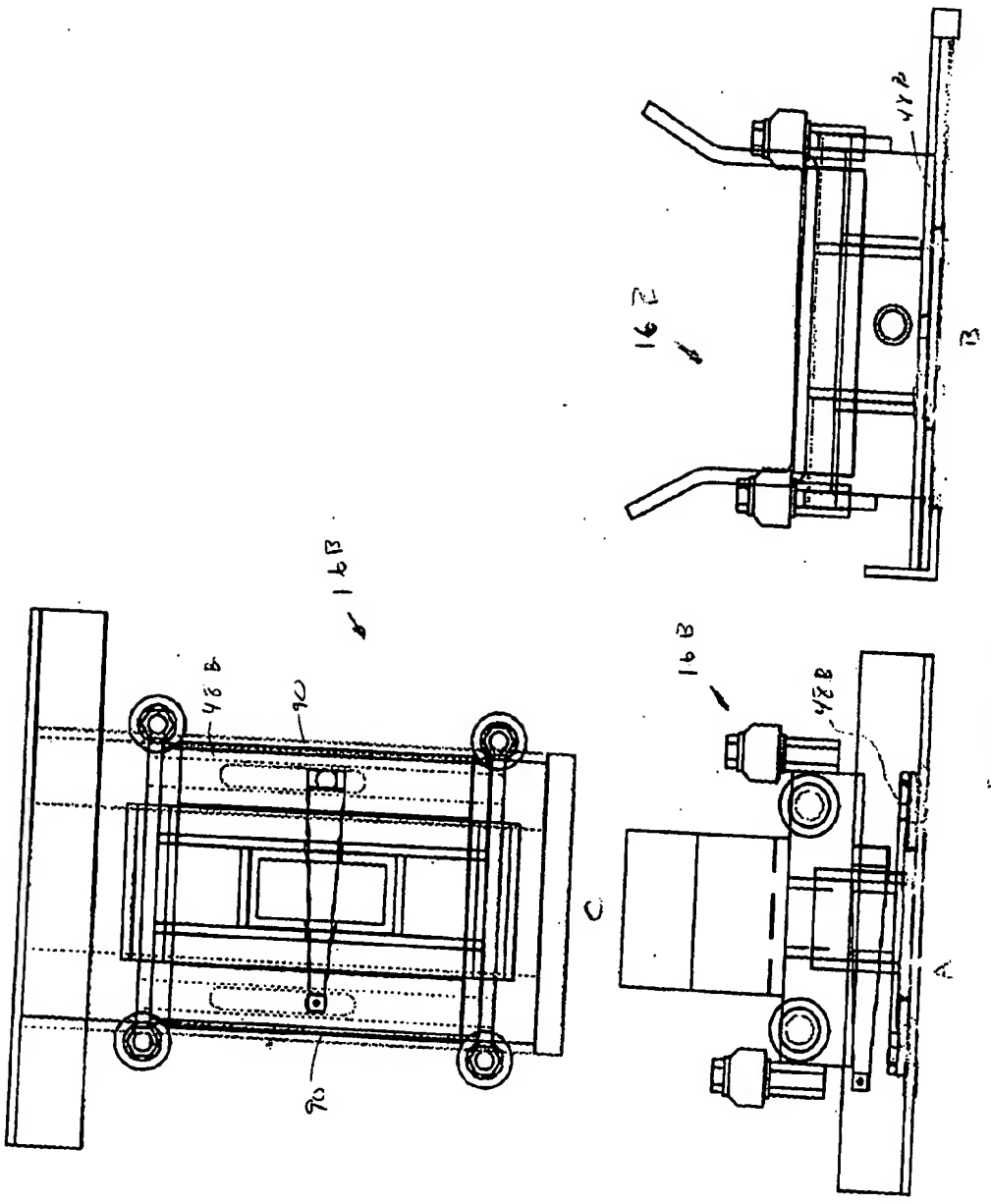


FIGURE 2.1